Title: Efficacy of OMRI-Approved Products for Tomato Foliar Disease Control

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Abstract:

Five materials approved by the Organic Materials Review Institute (OMRI) were tested for control of foliar diseases of tomato on an organic farm in western NY. Trials were conducted during the 2001 and 2001 growing seasons. Both seasons were exceptionally hot and dry, and disease pressure was light. Under these conditions, five of the treatments resulted in disease levels significantly different from the controls during at least one season.

Background and justification:

Certified organic farmers have a limited number of products approved for insect and disease management, and in many cases, efficacy information is difficult to find or absent. While soil building and other cultural practices are the basis for pest management on organic farms, certain insects and diseases still cause problems. Early blight and Septoria leaf spot on tomatoes can be problems on organic farms in wet seasons. We conducted these trials to see if any of the OMRI approved disease management products provide a significant level of control.

Objectives:

1) To determine the efficacy of OMRI approved disease management materials against tomato foliar diseases on a certified organic farm

Procedures:

1) A total of five materials approved for organic production were tested for foliar disease control on tomatoes on a certified organic farm in western New York. Trials were conducted during the 2001 and 2002 growing seasons. Tomatoes of the variety Daybreak were transplanted into black plastic with trickle irrigation on June 8 in 2001 and June 10 in 2002. The field rotation for the previous two years had been barley underseeded with clover followed by a year of clover hay. Composted chicken manure was broadcast over the field at a rate of 1T/A, and an additional 1.5T/A was rototilled into the beds before the plastic was laid. Between-row spacing was 6 ft. and in-row spacing was 18 inches. The plants were not staked. Plots consisted of 15 ft of a single row of plants. Treatments were replicated four times and randomized in a complete block design.

	Tested in:		
Treatment	**2001**	**2002**	**Rate**
Plantshield drench at transplant	√	√	10 oz./100 gallons
Plantshield foliar applications	√	√	2 lb./A
Mycostop drench at transplant		√	.01% suspension
Plantshield drench plus foliar	√	√	10 oz./100 gallons drench, 2 lb./A foliar
Trilogy	√	√	1% solution
Serenade		√	4 lb./A
Serenade		√	8 lb./A
Oxidate		√	128 oz/100 gallons
Untreated control	√	√	

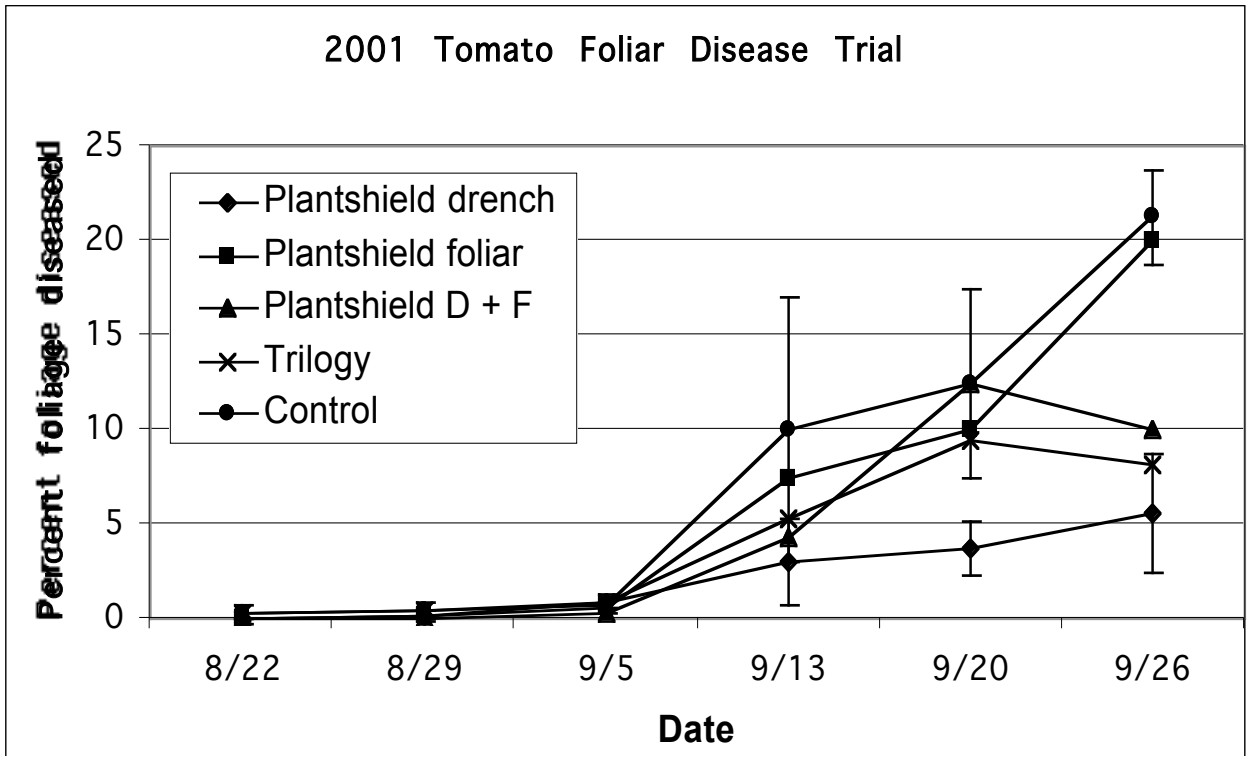
Plantshield is a formulation of the beneficial fungus *Trichoderma harzianum* labeled for foliar and soil drench applications. Mycostop is a formulation of the beneficial actinomycete *Streptomyces griseoviridis* labeled for seed treatment, potting soil amendment, and drench applications. Trilogy is a neem oil extract labeled for foliar application on a variety of fruit and vegetable crops. Serenade is a formulation of the beneficial bacterium *Bacillus subtilis* labeled for foliar application on a number of fruit and vegetable crops. Oxidate is a hydrogen peroxide product that is labeled for pre-pant dip treatment, soil drench, and foliar applications on a variety of crops. Plants in plots receiving the drench treatments were drenched the day after transplanting in 2001 and nine days after transplanting in 2002 with 4 oz. of solution, enough to saturate the root ball. Foliar treatments were applied with a CO2 backpack sprayer in the equivalent of 60 gpa of water. A soy oil-based spreader-sticker (Natur'l Oil, 0.2%) was used with the Plantshield and Serenade foliar applications. Each foliar treatment was applied three times, at approximately two-week intervals, starting on July 27 and ending on August 22 in 2001, and starting on July 31 and ending on August 28 in 2002. Percent foliage diseased was recorded for each plot at weekly intervals, starting August 22 in 2001 and September 12 in 2002. Plants in the middle 5 ft. of each plot were rated.

Results and discussion:

Both growing seasons were very dry, with a total 7.5 inches of rain falling during the months on June through September of 2001 and a total of 7.7 inches falling during the months of June through September in 2002. Leaf wetness periods were short during the entire period of both trials, and disease pressure was very light. The trickle irrigation kept the plants growing well, and the fruit load was heavy. When the last foliar treatments were applied, disease had not yet started to appear on the plants and harvest had not begun. Early blight (caused by *Alternaria solani*) was the only foliar disease observed in both trials.

Figure 1 shows the disease progression for the 2001 season. The error bars indicate the standard deviation for the Plantshield drench treatment and untreated control.

Figure 1



An analysis of variance performed on the data from the final disease rating revealed significant differences between treatments (p=.001). Least significant differences were calculated to separate means. Lowest levels of disease were observed in the Plantshield drench and Trilogy treatments (Table 1), which were both significantly different from the control. The Plantshield foliar and foliar plus drench treatments were not significantly different from the untreated control.

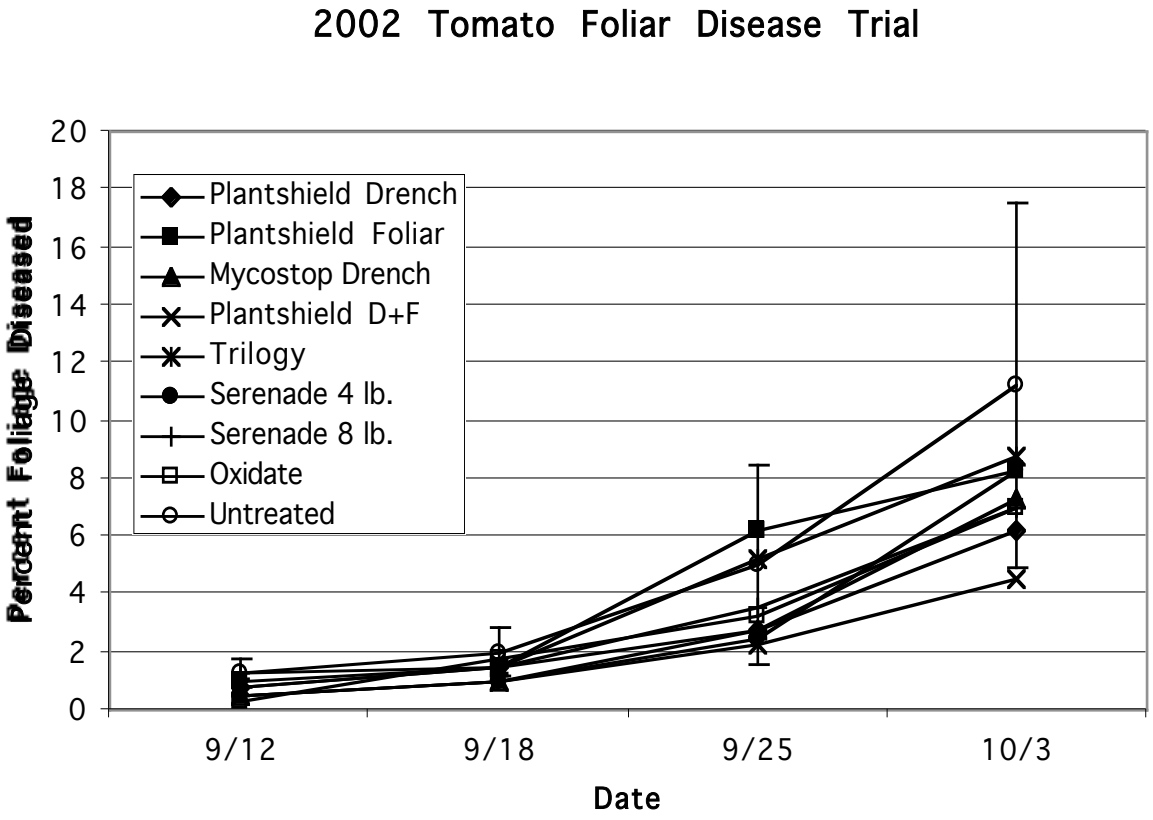
Table 1.
For 9/26 rating

Treatment	Mean	St. Dev
Plantshield drench	5.6a	3.1
Plantshield foliar	20b	7.1
Plantshield D + F	10ab	7.1
Trilogy	8.1a	3.7
Control	21.3b	2.5

LSD = 11.85

Figure 2 shows the disease progression for the 2002 growing season. The error bar indicates the standard deviation for the untreated control.

Figure 2.



An analysis of variance performed on the data from the final disease rating showed significant differences between treatments (p=.032). Least significant differences were calculated to separate means. Lowest levels of disease were observed in the Plantshield drench plus foliar treatment, which was significantly different from all other treatments. The Plantshield drench, Mycostop drench, Serenade 8 lb., and Oxidate treatments were significantly different from the untreated control. The Plantshield foliar, Trilogy, and Serenade 4 lb. treatments were not significantly different from the untreated control (Table 1).

Table 1.

Treatment	Percent Foliage Diseased
Plantshield Drench	6.25 bc
Plantshield Foliar	8.25 ab
Mycostop Drench	7.25 bc
Plantshield Drench + Foliar	4.50 c
Trilogy	8.75 ab
Serenade 4 lb.	8.25 ab
Serenade 8 lb.	7.00 bc
Oxidate	7.00 bc
Untreated Control	11.25 a

LSD = 3.4

Because both these trials were conducted in such dry seasons with low levels of disease in the untreated controls, it's difficult to demonstrate significant differences and also not possible to say with confidence that any of the products would provide adequate disease control during a wetter season. However, it is interesting to note that a treatment involving a drench of Plantshield resulted in the lowest disease levels in both trials, and that the foliar treatment alone was not significantly different from the control in either trail, indicating that the drench component of the treatment is providing the effect. The two soil-applied products (Plantshield and Mycostop) could be affecting the disease resistance of the foliage by inducing disease resistance or by increasing the vigor of the plants, making them less susceptible to a disease like early blight that is associated with plant stress.

Because of the dry seasons in which the trials were conducted, and the variable performance of Trilogy between the two trials, it would be useful to repeat the trial for one more season, hopefully one with better disease pressure.

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